

## CLAIMS:

1. An apparatus for facilitating the display and visually driven definition of tomographic image planes of a subject in three-dimensional (3-D) space, comprising:
- 5 an imaging device for acquiring one or more plane images of the subject;  
a 3-D model device, in communication with the imaging device, for generating a 3-D model based upon the one or more plane images acquired from the imaging device;  
an input device for receiving operator input, wherein the operator input defines an operator defined plane, and wherein a scan model of the operator defined plane is
- 10 incorporated into the 3-D model, and  
a display for presenting the 3-D model, wherein the 3-D model includes the operator defined plane, such that the operator can define an orientation of the operator defined plane in relation to one or more subject landmarks defined by the plane images acquired from the imaging device.
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2. The apparatus of claim 1, further comprising a scan geometry module that communicates with the input device to receive the operator input, wherein the scan geometry module generates scan geometry parameters representative of the operator input and communicates the scan geometry parameters to the imaging device such that
- 20 the imaging device can acquire the operator defined plane.
3. The apparatus of claim 2, wherein the 3-D model device updates the 3-D model to include the acquired operator defined plane.
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4. The apparatus of claim 3, wherein the input device enables the operator to define a new operator defined plane after the 3-D model has been updated to include the previously acquired operator defined plane.
5. The apparatus of claim 2, wherein the 3-D model device includes a scan model, for receiving the scan geometry parameters, and a subject model, for receiving image
- 30 data from the imaging device.

6. The apparatus of claim 1, wherein the imaging device is selected from one of the group consisting of a magnetic resonance imaging (MRI) scanner and an ultrasound machine.

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7. The apparatus of claim 1, wherein the input device enables the operator to alter the orientation of the operator defined plane in the 3-D model, such that the operator can interactively manipulate and view, via the display, the defined plane in the 3-D model to facilitate the determination of a desired operator defined plane.

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8. A method for enabling the interactive modification of operator defined scan geometry in an imaging system, comprising:  
 storing image planes, acquired from an imaging device, as image data;  
 transmitting the image data to a 3 dimensional (3-D) model device, wherein the 3-D model device constructs a 3-D model based on at least a portion of the image data;  
 displaying the 3-D model to an operator, and  
 enabling the operator to manipulate the 3-D model to define an operator defined image, wherein an object representing the operator defined image is presented with the 3-D model, such that the operator can determine the orientation of the operator defined image in relation to the one or more image planes acquired from the imaging device.

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9. The method of claim 8, further comprising acquiring the operator defined image based upon inputs received from the operator.

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10. The method of claim 9, further comprising updating the 3-D model to include the operator defined image.

11. The method of claim 10, further comprising querying the operator for input to enable the operator to define a new operator defined image to be generated.

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12. The method of claim 8, further comprising allowing the operator to manipulate

the updated 3-D model.

13. The method of claim 8, further comprising querying the operator for input to enable the operator to manipulate the object representing the operator defined image, such that the user can interactively manipulate the object representing the operator defined image in the 3-D model to facilitate the determination of a desired operator defined image.

14. A computer program product for use with a data processing system for facilitating the display and visually driven definition of tomographic image planes in three-dimensional (3-D) space, said computer program product comprising:

a computer usable medium having computer-readable code means embodied in said medium, said computer-readable code means comprising:

computer-readable code means for storing localizer images, acquired from an imaging device, as image data;

computer-readable code means for constructing a 3-D model based on at least a portion of the image data;

computer-readable code means for transmitting the 3-D model to a display for displaying the 3-D model to the operator, and

computer-readable code means for enabling the operator to manipulate the 3-D model to define an operator defined image to be generated.

15. The computer program product of claim 14, further comprising computer-readable code means for updating the 3-D model to include the operator defined image, acquired from the imaging device.

16. The computer program product of claim 15, further comprising computer-readable code means for querying the operator for input to enable the operator to manipulate the updated 3-D model.

17. The computer program product of claim 15, further comprising processing instructions for querying the operator for input to enable the operator to define a new operator defined image.

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